AF/2834

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

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| In re application of | : | **Confirmation No. 9834** |
| Hiroshi MURAKAMI et al. | : | Docket No. 00169/P22949-01(I.S.Nakano) |
| Serial No.09/520,149 | : | Group Art Unit 2834 |
| Filed March 7, 2000 | : | Examiner G. Perez |

PERMANENT MAGNET SYNCHRONOUS MOTOR

THE COMMISSIONER IS AUTHORIZED TO CHARGE ANY DEFICIENCY IN THE FEES FOR THIS PAPER TO DEPOSIT ACCOUNT NO. 23-0975



**APPELLANTS' REPLY BRIEF UNDER 37 CFR 1.193**

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

The following is the Appellants' Reply Brief, submitted in triplicate in accordance with the provisions of 37 CFR 1.193(b) in response to the Examiner's answer of November 19, 2002.

The Applicants' submit this reply brief in order to address comments set forth in the Examiner's Answer concerning claims 49-66 and European Patent No. 642210 A1 ("the Takahashi reference").

**1. Response to the Examiner's Comments Regarding Claims 49-54.**

On pages 11-13 of the Examiner's Answer, the Examiner responded to the Applicants' arguments set forth in the Appeal Brief filed August 21, 2002 directed to the Examiner's rejection of claims 49-54 as being unpatentable over the Applicants' admitted prior art (AAPA) in view of the Takahashi reference. However, the Applicants respectfully disagree with several points raised by the Examiner in this section of the Examiner's Answer, as discussed below.

Firstly, on page 12 of the Examiner's answer, the Examiner asserts that "a person with ordinary skill in the art could not specifically point out what type of winding is being used in Figs.

1, 5, and 8 of Takahashi." The Applicants respectfully disagree with this statement. As an initial matter, Figs. 1, 5 and 8 of the Takahashi reference clearly show that the stator core 1 is formed as one piece (although dotted lines are used as imaginary "break lines" to indicate the end of the segment shown in the figures), and it is known that one-piece stators generally utilize distributed windings. In contrast, as shown in Figs. 17A and 17B of the present application, a stator having concentrated windings is divided into separate core sections (i.e., teeth) 22 to allow the concentrated windings to be wound around each of the teeth. Thus, because one of ordinary skill in the art knows that a stator core formed as one piece generally utilizes distributed windings, that person would readily recognize that the one-piece stator shown in Figs. 1, 5 and 8 of the Takahashi reference has distributed windings.

Furthermore, if a stator utilizes concentrated windings, one of ordinary skill in the art would expect Figs. 1, 5 and 8 to show the windings tightly clustered on either side of each of the stator segments (identified as "teeth" 1b in the reference), as illustrated in Fig. 17b of the present application. However, the windings shown in Figs. 1, 5 and 8 are evenly spaced apart within each gap 1a between the "teeth" 1b of the stator 1, and are not tightly clustered against the sides of each of the teeth 1b. Therefore, one of ordinary skill in the art would further understand that the stator shown in the Takahashi reference has distributed windings, rather than concentrated windings.

Finally with respect to the type of windings in the Takahashi reference, the Examiner notes that the Takahashi reference acknowledges the problematic demagnetization of permanent magnets in rotors (column 7, lines 33-44), but the demagnetization discussed in the Takahashi reference is due to temperature increases. In contrast, stators having concentrated windings in which adjacent teeth have opposite polarities (as in the present invention) have a greatly increased risk of demagnitizing the rotor due to the magnetic field created by the concentrated windings (see paragraph 10 on page 3 of the specification). The Takahashi reference, however, does not discuss the increased risk of demagnitizing permanent magnets in the rotor due to the opposite polarities of adjacent teeth. Consequently, one of ordinary skill in the art would further recognize

this omission as evidence that the windings disclosed in the Takahashi reference are *distributed* windings rather than *concentrated* windings.

Secondly, on page 11 of the Examiner's answer, the Examiner asserts that the Takahashi reference discloses a clearance "s" between adjacent teeth of the stator which measures 1.08 mm, and an air gap "g" between the rotor and the stator which measures 2.01 mm (column 13, lines 16-38). However, the Applicants submit that the section of the Takahashi reference on which the Examiner relies for this disclosure is vague and does not clearly disclose this information. Specifically, it is submitted that the Takahashi reference merely teaches that a constant "Kg" has a particular value when the clearance is 1.08 mm, and that the constant Kg will also have that same value when a particular material is employed for the outermost tube portion. The Takahashi reference further explains that under specific operating conditions, the air gap will be equal to or greater than 2.01 mm "based upon the above formula" in which the constant Kg is used (although the constant Kg can be determined several different ways as discussed above). However, the Applicants respectfully submit that the Takahashi reference does not disclose or even suggest the relationship between the air gap Lg and the clearance La as recited in claims 49-54.

As explained above, one of ordinary skill in the art would readily understand that the Takahashi reference discloses a motor with *distributed* windings rather than concentrated windings. Furthermore, the Takahashi reference does not disclose or suggest the relationship between the air gap Lg and the clearance La, which is important in eliminating demagnetization when concentrated windings are utilized. Thus, one of ordinary skill in the art would not be motivated by the Takahashi reference to modify the AAPA so as to provide the present invention.

**2. <u>Response to the Examiner's Comments Regarding Claims 55-60</u>.**

On page 14 of the Examiner's answer, the Examiner again asserts that one of ordinary skill in the art could not specifically point out what type of winding is being used in Figs. 1, 5, and 8 of the Takahashi reference. However, as explained above with respect to claims 49-54, one of ordinary skill in the art would readily identify the windings of the Takahashi reference as *distributed* windings rather than concentrated windings.

Secondly, the Examiner acknowledges that neither the AAPA nor the Takahashi reference disclose the claimed range $2.0\ Lg < Lb \leq 5.0\ Lg$, in which Lb is the depth of the side edge of each tooth, and Lg is the air gap between the rotor and the stator. Nonetheless, the Examiner asserts that this relationship would be obvious because "where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955). However, the Examiner has failed to provide any evidence that the depth of the side edge of each tooth is recognized as a result-effective variable. It is well established that a particular parameter must first be recognized as a result-effective variable before the determination of the optimum or workable ranges of the variable can be characterized as routine experimentation, as suggested by the Examiner. See In Re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). In this regard, as shown in Figs. 1, 5, and 8 of the Takahashi reference, there is not even a reference number assigned to the depth of the side edge of each of the "teeth" of stator 1, and this element is also not discussed in the Takahashi reference. Thus, the Takahashi reference clearly does not recognize that this element would have any effect on improving the motor performance.

As explained above, one of ordinary skill in the art would readily understand that the Takahashi reference discloses a motor with *distributed* windings rather than concentrated windings. Furthermore, the Takahashi reference clearly does not even recognize that the depth of the side edge of each tooth is a result-effective variable, and thus also does not disclose any relationship between the depth of the side edge of each tooth and the air gap. Thus, one of ordinary skill in the art would not be motivated by the Takahashi reference to modify the AAPA so as to provide the present invention as recited in claims 55-60.

**3. Response to the Examiner's Comments Regarding Claims 61-66.**

The remarks set forth above with respect to claims 49-60 are also applicable to the Examiner's comments and rejections of claims 61-66. Thus, one of ordinary skill in the art would not be motivated by the Takahashi reference to modify the AAPA so as to provide the present invention as recited in claims 61-66.

In view of the above, as well as the arguments set forth in the Appeal Brief filed August 21, 2002, it is respectfully submitted that claims 49-94 are not obvious in view of the combination of prior art references applied by the Examiner. Accordingly, the Board is requested to reverse the rejections set forth in the final Office Action of February 21, 2002.

This Reply Brief is submitted in triplicate.

Respectfully submitted,

Hiroshi MURAKAMI et al.

By _____
W. Douglas Hahm
Registration No.44,142
Attorney for Appellants

WDH/mc
Washington, D.C.
Telephone (202) 721-8200
Facsimile (202) 721-8250
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